Appendices

DRAFT
STAFF REPORT

Adequacy of California Ambient Air Quality Standards

Senate Bill No. 25 – Children's Environmental Health Protection

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Appendix A

Children's Health Studies in California

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Appendix A. Studies of Children's Health and Air Pollution in California

A.1 Children's Health Study – Southern California

The ARB Children's Health Study is designed to assess the health effects on children of long-term exposures to southern California's mix of air pollutants (Peters et al., 1999). For up to eight years, the respiratory health of 5,000 children from 12 southern California communities, is being assessed annually. Initial findings indicate an association between poor air quality and lower lung function. Slower lung growth appears to be associated with exposure to particulate matter, nitrogen dioxide, and acid vapor. In communities with high ozone levels, lower lung capacity was seen in boys spending extensive amounts of time outdoors and in girls with asthma. The study will continue through 2003.

A.2 Fresno Asthmatic Children's Environment Study (FACES)

This ARB-sponsored study, about to begin in Fresno, will focus on childhood asthma and how air pollution exposures impact the progression and severity of the disease and overall respiratory health of 450 asthmatic children. The children will be followed for up to four years. The overall goal is to determine the effects of exposure to particulate matter air pollution in combination with other pollutants, on asthmatic children. The study addresses the concern that repeated short-term responses to air pollution may translate into long-term health effects, that include the worsening of asthma over time.

A.3 L.A. Children's Asthma Studies

OEHHA has completed two studies, sponsored by the Centers for Disease Control and Prevention (CDC) with supplemental funding from ARB, examining the effects of air pollution on asthma among African-American children living in Los Angeles. The sutdy focused on African-American children since this subgroup appears to be driving the significant increase in asthma morbidity and mortality observed throughout the United States over the last two decades. In a pilot study, 83 children aged 7 to 12 years, were recruited from allergy and pediatric clinics in central Los Angeles. Daily data on asthma symptoms were obtained over a three-month period, along with daily pollution and meteorological data. This study demonstrated an association between PM10 and several different asthma symptoms, including shortness of breath (Ostro et al., 1995).

In the full epidemiological study, 138 children in central Los Angeles and Pasadena were recruited. Daily data on respiratory symptoms and medication use were recorded for 13 weeks and examined in conjunction with data on ozone,

nitrogen dioxide, particulate matter (PM10 and PM2.5), meteorological variables, pollens, and molds. Using generalized estimating equations, an association was found between daily PM10 and several different asthma symptoms including shortness of breath, cough and wheeze (Ostro et al., 2000). In addition, nitrogen dioxide and outdoor molds were associated with asthma exacerbation. The impact of air pollution on this population of African-American children in Los Angeles with asthma was clinically meaningful. For example, for an interquartile change in PM10 of 17 $\mu g/m^3$, there were 14% increase in daily shortness of breath and 10% increase in daily cough.

A.4 Pediatric Asthma in Sacramento

OEHHA has completed a study to determine whether indigent populations might be at increased risk of asthmatic exacerbation from exposure to ambient air pollution relative to the general population (Lipsett et al., 1999). To begin to address this issue, the potential associations between ambient air pollution and asthma exacerbation among young Medi-Cal beneficiaries in the Sacramento metropolitan area was examined. Hospital admission and emergency room visit claims were aggregated to create daily counts of asthma-related Medi-Cal events for beneficiaries under age 20 for the period January 1992 to April 1994. Daily population exposures to ambient levels of nitrogen dioxide, carbon monoxide, ozone, and coefficient of haze (a measure particulate matter) were measured. Significant associations were found between claims and daily concentrations of ozone, nitrogen dioxide, and coeffficient of haze. This study suggests significantly increased risks of clinically meaningful, air pollution-related asthma exacerbations in an indigent population.

A.5 Children's Activity Pattern Study and Breathing Study

ARB sponsored a study, completed in 1991, that examined the activity patterns of 2000 children ages 0-11, especially those aspects most relevant to air pollutant exposures (Wiley et al., 1991a) Diary information was obtained on the time spent in different locations and activities throughout the day, and on the children's proximity to, and use of, specific sources of pollutants throughout the day. A prior, similar study of adult Californians obtained similar data on teenagers (Wiley et al., 1991b) ARB also sponsored a study of Californians' pulmonary ventilation (breathing) rates and volumes during normal activities, such as walking and playing, on the largest group of children to date (Adams, 1993). These studies together have been used extensively to improve estimates of children's exposures to air pollutants.

A.7 References

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